

## ASTRONOMY

# Million Billion Years Old

**Atomic nuclei groupings give clue that universe may be a million billion years old. Stars and galaxy cores can only grow to a limited size.**

► THE UNIVERSE may be a million billion years old, not just 12 or so billion years old, an astronomer reported.

Dr. Fritz Zwicky of Mt. Wilson and Palomar Observatories told the American Astronomical Society meeting in Mexico City that a million billion years was the least time required for the formation of galaxies, vast stellar systems.

Dr. Zwicky bases his estimate for the age of the universe on the fact that atomic nuclei, the building blocks of matter, react with one another and can radiate. Because atoms react, characteristic groupings of matter are built up. Among these groupings, the stars, of which the sun is only one of millions within the Milky Way, are the most prominent.

Stars cannot grow beyond a certain size because of destructive effects of the energies released when atomic nuclei react, Dr. Zwicky reported. The next higher units of matter are those of the centers of galaxies.

Galactic centers, also, cannot build up beyond a certain size because of certain destructive effects. If they could continue building, they would grow in size indefinitely.

Since there is a limiting size, however, Dr. Zwicky suggests that the cores of galaxies represent a new unit of cosmic matter, the true character of which has not yet been recognized. This character is,

however, "just as distinctive as the character of stars," Dr. Zwicky reported.

He described galaxies as follows:

Around a dense and very luminous nucleus, a large disk of much lower brightness is found. The nucleus is some tens of light years in diameter, a light year being the distance light travels in a year at 186,000 miles a second, or some six million million miles.

The disk is surrounded first by a scattered "suburban" population of stars, gas and dust clouds that may be lined up along a number of more or less well defined spiral arms. Around this suburban population there may be a faint halo of stars and dark gases. Finally there are intergalactic formations hovering around the galaxy.

The disk, suburban populations, halos and intergalactic formations have dimensions of a few to many thousands of light years, always much larger than the nuclei of galaxies.

Dr. Zwicky reported that attempts will be made by Dr. John Strong and his associates at Johns Hopkins University in Baltimore to observe the size of the Milky Way galaxy's nucleus in the ultrafar infrared light.

This light is not scattered by the interstellar dust clouds that obscure the view of the Milky Way's center in visual or photographic wavelengths.

He urged exploration of the Milky Way's structure in the ultrafar infrared rays from high-flying balloons or rockets, or from a U-2 plane.

Dr. Zwicky's view that stars are captured and whittled down within the nucleus of galaxies is of great importance for the theory that the universe is in a steady state, with stars being constantly formed. On this basis, he estimates that the age of the universe is more than a million billion years.

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## ROCKETS AND MISSILES

## Manned Space Flight From Russia Seen Near

► "WE HAVE crossed the threshold of manned space flight," a Russian scientist announced.

As Free World scientists read closely the reports of the USSR's latest space triumph, they were inclined to agree. The Russians—right after the United States successfully recovered capsules from orbiting Discoverer XIII and XIV—topped them with a single massive effort.

The Russian satellite was larger than any U. S. rockets could have put up. Inside the Spaceship were dogs, Strelka (Arrow) and Belka (Squirrel), rats, mice, flies, plants and seeds. Russian scientists watched the dogs' reactions via television.

The Spaceship circled the earth every 90.6 minutes. It was 198.8 miles above the earth. On ground command, during its 18th orbit, its course was changed by small rockets.

Protected by a thermal shield probably like that planned for America's Mercury capsule, the satellite re-entered the earth's atmosphere. Then a capsule, containing the animals, separated and floated down within 6.2 miles of the target area planned, the Russians said.

The animals are well, apparently unharmed by their precedent-breaking flight.

In this Space Age, mice and dogs often are rushed in where man is soon to tread. It now looks as if Russia will soon orbit a man—maybe even two.

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## ROCKETS AND MISSILES

## First Satellite Capsule Recovered in Mid-Air

► THE UNITED STATES, like the USSR, has made important re-entry progress. After re-entry similar to that of the capsule of Discoverer XIII, Discoverer XIV's capsule was snagged in mid-air high over the Pacific by an Air Force crew flying a specially equipped Fairchild C-119 Flying Boxcar.

The recovery equipment consisted of two long parallel poles protruding downward from the rear cargo hatch with a long loop of nylon rope slung trapeze-like between the poles. Attached to the nylon rope, at the ends of the poles, were small grappling hooks that snagged the parachute when it was contacted.

When the parachute was engaged, it was reeled into the aircraft with an electric winch.

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**SPACE CAPSULE CAPTURED**—The Discoverer XIV space capsule is recovered in mid-air for the first time by an Air Force crew in a Fairchild C-119 Flying Boxcar. The recovery equipment used was made by All American Engineering Company, Wilmington, Del.